

Claims

What is claimed is:

1. A system for *in-situ* regulation of an etch process employed in fabricating a multi-sloped semiconductor feature on a wafer, comprising:
 - one or more etching components operative to etch at least one aspect of a multi-sloped feature on a wafer;
 - an etch component controller for controlling the one or more etching components;
 - a system for directing light onto the wafer;
 - a measuring system for measuring at least one etching parameter based on light reflected from the wafer; and
 - a process analyzer operatively coupled to the measuring system and the etch component controller, wherein the process analyzer receives the measured parameters from the measuring system and analyzes the measured parameters to determine whether adjustments to the etching components are needed to fabricate the multi-sloped features within desired critical dimension tolerances and where the process analyzer stores the measured parameters to facilitate reproducing process conditions.
2. The system of claim 1, the measuring system further including a scatterometry system for collecting the reflected light, wherein the measuring system interprets the reflected light to produce the measured etch parameters using scatterometry techniques.
3. The system of claim 2, wherein the measured etch parameters include at least one of feature height, feature width, slope of one or more feature sides and angles between feature sides.
4. The system of claim 3, wherein the multi-sloped feature has one or more angles between feature sides that are not right angles.

5. The system of claim 2, wherein the process analyzer:
partitions the wafer into a plurality of grid blocks; and
determines whether to make adjustments to one or more etching components associated with one or more grid blocks by analyzing measured etch parameters corresponding to one or more grid blocks.

6. The system of claim 5, wherein the process analyzer determines that adjustments to one or more etching components are necessary for at least a portion of the wafer by comparing one or more measured etch parameter values to one or more stored acceptable etch parameter values.

7. The system of claim 6, wherein the stored acceptable etch parameter values are stored as scatterometry signatures.

8. A method for *in-situ* regulation of a process for etching a multi-sloped semiconductor device formed on a wafer, comprising:
partitioning the wafer into one or more portions;
etching at least one multi-sloped device on at least one portion of the wafer;
directing light onto at least one portion of the wafer;
collecting light reflected from the at least one portion;
analyzing the reflected light to determine the acceptability of the multi-sloped semiconductor device on the at least one portion;
storing data associated with the acceptability of the multi-sloped semiconductor device and one or more processing conditions associated with creating the multi-sloped semiconductor device to facilitate reproducing the one or more processing conditions; and
selectively controlling one or more etching components to regulate the etching of the multi-sloped semiconductor device on the at least one portion.

9. The method of claim 8, wherein the light is collected by a scatterometry measuring system.

10. The method of claim 9, wherein the scatterometry measuring system interprets the reflected light into measured etch parameters associated with the at least one portion using scatterometry techniques.

11. The method of claim 10, wherein the measured etch parameters are compared to stored acceptable etch parameter values in order to determine whether one or more adjustments to the process for etching a multi-sloped semiconductor device formed on a wafer is necessary.

12. A method for *in-situ* regulation of an etch process of a multi-sloped semiconductor device formed on a wafer, comprising:

partitioning the wafer into a plurality of grid blocks;

using one or more etching components to etch a multi-sloped semiconductor feature on the wafer, each etching component functionally corresponding to a respective grid block;

measuring at least one etch parameter associated with the multi-sloped semiconductor feature;

determining etching conditions at the at least one grid block according to the measured etch parameter; and

using a process analyzer to selectively control the plurality of etching components to compensate for wafer to wafer variations during the etch process of the multi-sloped feature.

13. A system for *in-situ* regulation of an etch process of a multi-sloped semiconductor device formed on a wafer, comprising:

means for partitioning the wafer into a plurality of portions;

means for etching at least one multi-sloped device on at least one portion of the wafer;

means for directing light onto at least one portion of the wafer;

means for collecting light reflected from the at least one portion;

means for analyzing the reflected light to determine the acceptability of the etching of the at least one portion; and

means for selectively controlling one or more etching components to regulate the etching of the multi-sloped semiconductor device on the at least one portion.

14. A data packet adapted to be transmitted between two or more processes, the data packet containing information related to *in-situ* adaptation of an etch process

employed in fabricating a multi-sloped semiconductor device, where the information was generated by a system for *in-situ* regulation of an etch process employed in fabricating a multi-sloped semiconductor feature on a wafer, the system comprising:

one or more etching components operative to etch at least one aspect of a multi-sloped feature on a wafer;

an etch component controller for controlling the one or more etching components;

a system for directing light onto the wafer;

a measuring system for measuring at least one etching parameter based on light reflected from the wafer; and

a process analyzer operatively coupled to the measuring system and the etch component controller, wherein the process analyzer receives the measured parameters from the measuring system and analyzes the measured parameters to determine whether adjustments to the etching components are needed to fabricate the multi-sloped features within desired critical dimension tolerances and where the process analyzer stores the measured parameters to facilitate reproducing process conditions.